Original Article

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Clinical Outcome of Lower Extremity Firearm Injuries in Adult Civilians: Shotgun versus Pistol Wounds

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ABSTRACT

Background and Aims: The objective of this study was to compare the effects of firearm injury types on disability, length of hospital stay, and functional and clinical outcomes in patients with shotgun or pistol wounds. Factors affecting morbidity in firearm injuries were also investigated.

Materials and Methods: In this multicenter study, 124 patients with at least two years of follow-up over a 10-year period were retrospectively analyzed. Patients were categorized into two groups—shotgun injuries and pistol injuries—based on the type of weapon that caused their wounds. The Lower Extremity Functional Scale (LEFS), Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), and Short Form-36 Health Survey (SF-36) were used to assess outcomes.

Results: The mean age of patients with firearm injuries was 36.48 ± 11.25 years, with a follow-up period of 42.54±16.7 months. Comparisons between the groups revealed no statistically significant differences in age, Injury Severity Score (ISS), WOMAC, SF-36, and LEFS scores ($p>0.05$). However, the length of hospital stay and follow-up duration were significantly longer in patients with shotgun injuries compared to those with pistol injuries ($p<0.05$).

Conclusion: According to the main results of this study, clinical scores were found to be worse and length of stay was longer in shotgun wounds compared to pistol wounds. Neurovascular injury, soft tissue complications, and high injury severity may also negatively affect clinical outcomes.

Keywords: Ballistic wound, complications, firearm injury, lower limb injury, trauma.

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INTRODUCTION

Firearm related injury in civilians, resulting from assaults, accidents, or suicide attempts, pose a significant global public health problem. The incidence of firearms-related injuries continues to rise worldwide.[1-3] Firearm injuries are the most common cause of injury-related deaths after poisoning and motor vehicle accidents.[4] In recent years, the rate of non-lethal firearm injuries has surpassed fatal injuries, with approximately 49% to 67% of these injuries affecting the extremities,[5-8] and around 40% occurring in the lower extremities.[9] Furthermore, nearly half of all hospitalizations due to firearm injuries require fracture care, making orthopedic surgeons primarily responsible for managing these patients.[10] Non-fatal firearm injuries can result in varying degrees of tissue damage. These injuries may range from isolated soft tissue damage to severe complications, including complex neurovascular injury, fractures, compartment syndrome, infection, nerve palsy, and amputation. Consequently, firearm injuries can lead to significant musculoskeletal morbidity, long-term functional disability, and prolonged hospital stays.[6,11-17]

Firearms such as shotguns and pistols cause most of these injuries in civilians.[14] The severity of the damage to the patient is determined by the type of firearm, shooting range distance, bullet characteristics, and tissue properties.[4,7,8,14,16,18] Although shotgun and pistol wounds are often grouped together, they exhibit significant ballistic and clinical differences.[3–11] To our knowledge, there are few studies comparing shotgun and pistol injuries.[11,19,20]

The objective of this study was to compare the effects of firearm injury types on disability, length of hospital stay, and functional and clinical outcomes in patients with shotgun or pistol wounds. We also investigated factors affecting morbidity in firearm-related injuries.

METHODS

The study was conducted as a multicenter investigation in the hospitals where the authors practiced. Patients were retrospectively divided into two groups according to the type of firearm injury. Approval for this retrospective multicenter study was obtained from Alanya Alaaddin Keykubat University, Clinical Research Ethics Committee (Approval Number: 49404, Date: 03.01.2022, Updated: 26.01.2022/01-01). The procedures adhered to the ethical standards of the committee responsible for human experimentation and the principles of the Helsinki Declaration of 1975, revised in 2000.

All medical records and radiographs of patients treated for firearm injuries between January 2010 and January 2020 were reviewed by the authors. The results of 124 patients who met the inclusion criteria and were followed up regularly for at least two years were analyzed.

Inclusion Criteria: Patients over 18 years of age, wounded by a shotgun or pistol, with lower extremity damage and no previous vascular or nerve pathology.

Exclusion Criteria: Upper extremity injury, inadequate data files, patients lost to follow-up, and previous lower extremity injury and/or vascular and nerve damage.

Pistol Wound Group: This group consisted of 55 adult civilian patients without any comorbidities who were injured by pistol bullets fired from various distances (Figs. 1–2).

Shotgun Wound Group: This group consisted of 69 adult civilian patients without any comorbidities who were injured by shotgun pellets fired from various distances (Figs. 3–5).

Over this ten-year period, patients were categorized into two groups: young adults with lower extremity gunshot wounds caused by shotguns or pistols. Life-saving procedures, including airway, breathing, circulation (ABC) assessment and resuscitation, were performed as a priority for all patients who presented to our emergency department with firearm injuries. During the initial examination, the location of bullet or pellet entry and exit wounds, neurovascular status of the affected extremity, and injuries to other systems were meticulously evaluated. All patients were immobilized with a temporary splint following the administration of broad-spectrum antibiotics, tetanus prophylaxis, and adequate debridement. A dressing was applied to devitalized tissues. The severity of the injury at the time of admission to the emergency department was assessed by an orthopedic specialist, and the Injury Severity Score (ISS) was recorded.[11,13] The shooting range distance of firearm injuries was classified as long, medium, or close range.[11,15] Patients were admitted to the Orthopedics and Traumatology Clinic after their initial evaluation and emergency surgical interventions. Based on the assessments, either emergency or elective surgical treatments were performed, and patients were followed up periodically both during hospitalization and after discharge. Both cefazolin (3 g, IV) and gentamicin (240 mg, IV), divided into three doses, were administered daily to all patients, and this antibiotic regimen was continued for three to ten days depending on associated injuries.[17]

Data Collection and Recording

In addition to the above mentioned clinical assessments, data were collected on accompanying injuries, complications, length of hospital stay, bone and soft tissue healing processes during post-discharge follow-up, fracture union status, and extremity function at the final follow-up examination.

The results were analyzed both as a whole and through comparisons between groups. Patients who were discharged after completing treatment and followed up for at least two years were assessed for physical function and overall clinical status. These evaluations were conducted using the Lower Extremity Functional Scale (LEFS),[21,22] the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC),[23] and the Short Form-36 Health Survey (SF-36).[24,25] Fracture union was assessed both radiologically and clinically.[26] Clinical

Figure 1. 31-year-old male patient with a pistol wound and a comminuted fracture of the proximal femoral diaphysis.

Top row: Bullet entry wound observed during initial evaluation in the emergency room and emergency surgical treatment in the operating room; bullet hole visible.

Lower row: Comminuted proximal femur fracture on the initial radiograph; emergency surgical treatment with external fixator application. Postoperative anteroposterior (AP) and lateral X-ray images.

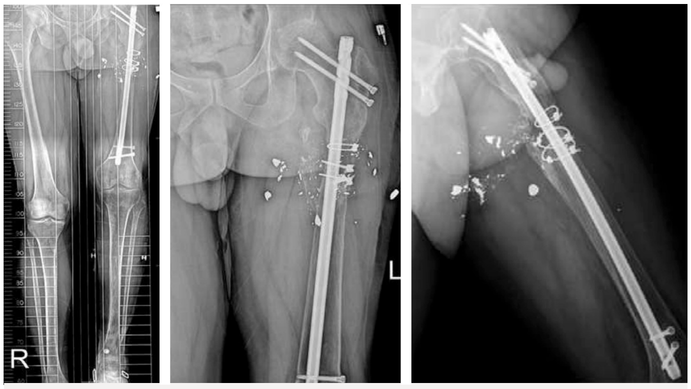

Figure 2. Follow-up of the same patient's definitive treatment with an intramedullary nail at the third year. A noticeable leg length discrepancy is observed. Fixation with intramedullary nail, AP and lateral views.

fracture union was defined as the absence of pain with weight-bearing and no movement at the fracture site.[27] Radiological fracture union was determined by the presence of callus bridging (bone or trabeculae), bridging of the fracture line in three planes, and the absence of a visible fracture line.[28]

Statistical Analyses

Statistical analyses were performed using SPSS software (version 25.0; SPSS Inc., Chicago, IL, USA). Categorical data were presented as number (n) and percentage (%), while numerical data were expressed as mean±standard deviation (SD) or median (min-max) values. The Shapiro-Wilk test was used to assess the normality of data distribution. In comparisons between the groups, significance analysis was performed using the chi-square test for categorical data. For continuous data, either the parametric t-test or the non-

Figure 3. 13-year-old male patient injured by a shotgun at close range. Comminuted fracture and tissue defect present in the distal tibial diaphysis.

Top row: Frontal and lateral views of the injury during initial evaluation in the emergency department.

Lower row: AP and lateral views of the comminuted distal tibial fracture on the initial radiograph.

parametric Mann–Whitney U test was used. The relationship between independent and dependent variables was analyzed using the Spearman correlation test. A p value of <0.05 was considered statistically significant.

RESULTS

All patients with firearm injuries in this study were civilians, with the majority being male (81.5%). The most common type of gunshot wound resulted from a close-range shot (43.5%). The most frequent site of open fractures following shotgun or pistol injuries was the hip-thigh region (35.5%). Primary closure of soft tissue injury (60.5%) was the most common type of injury, often accompanied by additional abdominal organ injury (22.6%). Soft tissue debridement was performed as the initial treatment for all patients. The injured extremity was temporarily immobilized using various methods. For permanent fracture fixation, intramedullary nailing (37.1%) was the most frequently used technique, while the most

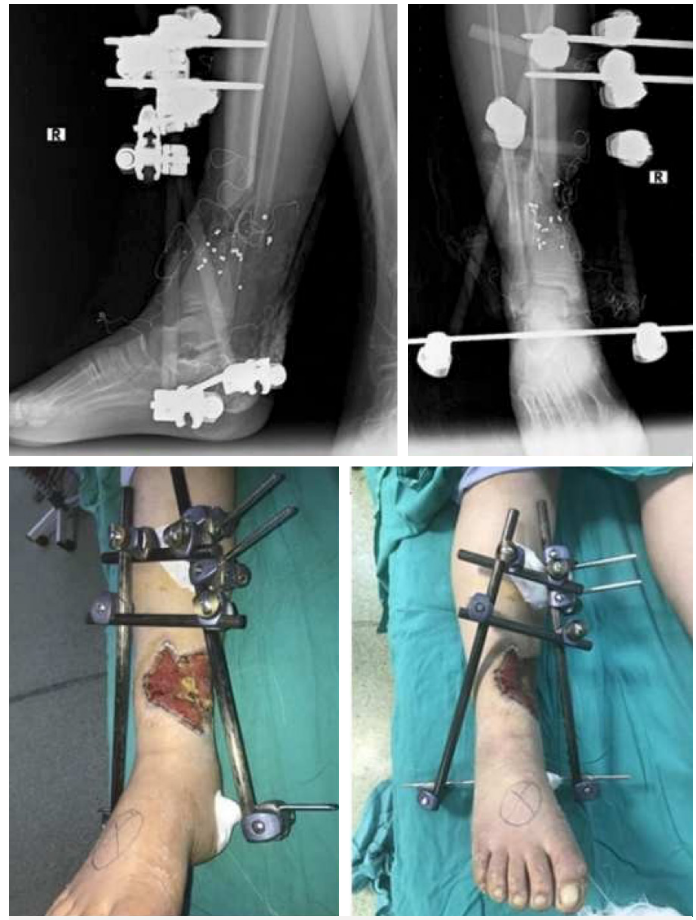

Figure 4. Emergency surgical treatment of the above patient: fixation with external fixator following debridement.

Top row: Postoperative AP and lateral radiographs following emergency surgical treatment.

Lower row: Clinical images at six months postoperatively showing skin graft application.

common method for soft tissue closure was skin flaps (15.3%). The most common complications following firearm injuries were joint contracture and Sudeck's atrophy (10%).

The mean age of patients in this study was 36.48±11.25 years, and the follow-up period was 42.54±16.7 months. The demographic and clinical data are presented in Table 1 for continuous variables and in Table 2 for categorical variables.

In the comparative analysis, no statistically significant difference was found between the shotgun injury and pistol injury groups regarding age, ISS, WOMAC, SF-36, and LEFS scores ($p>0.05$). However, the length of hospital stay (LOS) and

Figure 5. Definitive osteosynthesis performed using plate and screws. AP and lateral X-ray images at the second postoperative year.

follow-up periods were significantly longer for patients with shotgun injuries than for those with pistol injuries (p<0.05) (Table 1).

No statistically significant differences were found between the groups in terms of gender, type of firearm injury, additional organ injury, permanent fracture treatment, need for additional treatment, and complications (p>0.05). However, statistically significant differences were observed between the two groups regarding the injured area, injured tissue, and initial emergency treatment (p<0.05) (Table 2). Reviewing the significant results: vascular injury, compartment syndrome, multiple tissue injuries, and muscle–tendon injuries were observed at a higher rate in the shotgun injury group compared to the pistol injury group. Moreover, injuries to the leg and foot regions where soft tissue coverage is limited were significantly more common in the shotgun injury group. Additionally, the need for debridement, irrigation, and external fixator application as part of initial emergency treatment was observed at a higher rate in the shotgun injury group compared to the pistol injury group (Table 2).

When the correlation between independent variables (shotgun vs. pistol) and dependent variables (LEFS, WOMAC, SF-36, ISS, length of hospital stay, and follow-up duration) was analyzed, statistically significant positive correlations

Table 1. Demographic and clinical data of patients (continuous-numerical variables) comparisons between shotgun and pistol injury groups (mean-median)

	All Patients		Shotgun injury			Pistol Injury			p
Parameters	A.A.±S.D	Med (min-max)	A.A.±S.D.	Med (IQR)	min-max.	A.A.±S.D.	Med (IQR)	min-max.	
Age (years)	36.48±11.25	35 (13-67)	36.93±12.25	38 (28-43.5)	13-67	35.93±9.94	34 (29-42)	21-61	0.563 (z=-0.579)
ISS	30.34±10.44	27 (11-56)	30.67±10.96	30 (22-37.5)	11-56	29.93±9.85	25 (23-36)	19-54	0.693 (z=-0.395)
LOS (days)	10.98±8.43	8 (1-45)	13.17±9.9	11 (5-17.5)	1-45	8.22±4.97	7 (5-10)	2-24	0.004* (z=-2.896)
Follow-up (months)	42.54±16.7	38 (20-98)	49.32±18.28	47 (36-61)	20-98	34.04±9.08	32 (27-38)	23-65	0.0001* (t=6.069)
WOMAC	52.21±16.48	50 (22-90)	53.95±17.68	50 (40-72)	24-90	50.83±15.46	50 (41.5-62)	22-88	0.596 (z=-0.531)
SF-36 physical	58.73±19.99	61.5 (15-87)	56.88±20.66	60 (40-74.5)	15-87	61.05±19.05	64 (45-80)	25-86	0.292 (z=-1.054)
SF-36 general	55.38±16.93	58 (15-92)	53.38±17.09	56 (39.5-68)	15-86	57.89±16.55	61 (44-71)	28-92	0.141 (t=-1.482)
LEFS	48.06±16.26	51 (12-77)	46.58±16.71	50 (33-60)	14-77	49.91±15.64	53 (40-60)	12-75	0.333 (z=-0.969)

*p<0.05 indicates a statistically significant difference. Mean: Arithmetic Average; SD: Standard Deviation; Median (IQR): Median (25th and 75th percentiles); Min-Max: Minimum-Maximum Values; t: Independent Samples t-Test; z: Mann-Whitney U test. LOS: Length of hospital stay.

Table 2. Demographic and clinical characteristics of patients (categorical-ordinal) Comparisons between shotgun and pistol injury groups (percent variables)

Parameter	Group				Total		p
	Shotgun Injury		Pistol Injury				
	n	%	n	%	n	%	
Gender							
Male	55	79.7	46	83.6	101	81.5	0.576
Female	14	20.3	9	16.4	23	18.5	(CT = 0.312)
Firearm injury distance							
Long distance	17	24.6	7	12.7	24	19.4	0.226
Medium distance	25	36.2	21	38.2	46	37.1	(CT = 2.972)
Close distance	27	39.1	27	49.1	54	43.5	
Injured region							
Pelvis-acetabulum	5	7.2	0	0	5	4	0.022*
Hip-thigh	18	26.1	26	47.3	44	35.5	(CT = 11.453)
Knee-leg	28	40.6	15	27.3	43	34.7	
Ankle-foot	16	23.2	13	23.6	29	23.4	
Multiple regions	2	2.9	1	1.8	3	2.4	
Injured tissue							
Vessel injury	6	8.7	1	1.8	7	5.6	0.012*
Nerve injury	3	5.5	0	0	3	2.4	(CT = 16.275)
Soft tissue defect	11	15.9	10	18.2	21	16.9	
Soft tissue injury (Primary closure possible)	38	55.1	37	67.3	75	60.5	
Muscle-tendon injury	8	11.6	4	7.3	12	9.7	
Compartment syndrome	3	4.3	0	0	3	2.4	
Multiple tissue involvement	3	4.3	0	0	3	2.4	
Additional organ injury							
None	28	40.6	23	41.8	51	41.1	0.519
Abdomen	14	20.3	14	25.5	28	22.6	(CT = 4.216)
Chest	7	10.1	9	16.4	16	12.9	
Head	6	8.7	4	7.3	10	8.1	
Upper extremity	10	14.5	3	5.5	13	10.5	
Spine	4	5.8	2	3.6	6	4.8	
Initial emergency treatment							
Debridement, irrigation, splint	35	50.7	40	72.7	75	60.5	0.001*
Debridement, irrigation, external fixator	34	49.3	12	21.8	46	37.1	(CT = 13.873)
Debridement, irrigation, skeletal traction	0	0	3	5.5	3	2.4	
Definitive fracture management							
Intramedullary nailing	29	42	17	30.9	46	37.1	0.603
Plate & screw fixation	20	29	17	30.9	37	29.8	(CT = 1.855)

Table 2. Demographic and clinical characteristics of patients (categorical-ordinal) Comparisons between shotgun and pistol injury groups (percent variables) (CONT.)

Parameter	Group				Total		p
	Shotgun Injury		Pistol Injury				
	n	%	n	%	n	%	
External fixator (Ilizarov)	18	26.1	17	30.9	35	28.2	
Plaster splint (Conservative)	3	4.3	3	5.5	6	4.8	
Additional treatments							
None	36	52.2	34	61.8	70	56.5	0.741
Decompression (Abdominal, chest, head)	6	8.7	5	9.1	11	8.9	(CT = 3.522)
Vessel-nerve repair	7	10.1	2	3.6	9	7.3	
Tissue flap	1	1.4	2	3.6	3	2.4	
Tendon repair/transfer	3	4.3	2	3.6	5	4	
Skin gaft	12	17.4	7	12.7	19	15.3	
Multiple treatments (Vessel, nerve, flaps, tendon, decompression)	4	5.8	3	5.5	7	5.6	
Late complications							
None	34	49.3	32	58.2	66	53.2	0.57
Chronic pain	3	4.3	3	5.5	6	4.8	(CT = 7.648)
Wound healing issues with tissue defect (Muscle-tendon)	3	4.3	2	3.6	5	4	
Non-union	2	2.9	2	3.6	4	3.2	
Malunion, limb shortening	7	10.1	2	3.6	9	7.3	
Chronic osteomyelitis	2	2.9	1	1.8	3	2.4	
Arthrosis, ankylosis	4	5.8	3	5.5	7	5.6	
Joint contracture	5	7.2	5	9.1	10	8.1	
Sudeck's atrophy, neuropathic pain	5	7.2	5	9.1	10	8.1	
amputation	4	5.8	0	0	4	3.2	

*p < 0.05 indicates a statistically significant difference. CT: Chi-square test.

were found between ISS scores, length of hospital stay, and WOMAC scores in both groups (Table 3). Conversely, statistically significant negative correlations were observed between SF-36 physical and general health scores and LEFS scores (Table 3). As the initial ISS increased, hospitalization duration was prolonged, and clinical-functional scores were adversely affected. Although there was no statistically significant difference between the two firearm type groups, WOMAC, SF-36, and LEFS scores were worse in the shotgun group (Table 1). Moreover, our LEFS results—which better reflect clinical outcomes of the lower extremity compared to general scores—showed a strong negative correlation in the shotgun group, indicating that the decline in clinical scores was more pronounced in this group (Table 3).

DISCUSSION

This multicenter retrospective study investigated the clinical and functional outcomes of civilian lower extremity firearm injuries, comparing shotgun and pistol-related wounds. Although both types of firearms resulted in similar injury severity scores and functional outcome measures, shotgun injuries were associated with significantly longer hospital

Table 3. Correlation analysis results in both groups

Group	Parameter		ISS	Length of hospital stay	Follow-up	WOMAC	SF-36 Physical	SF-36 General	LEFS
Shotgun injury group	Age	r	-0.024	0.166	0.016	-0.061	0.019	0.029	-0.024
		p	0.845	0.172	0.896	0.617	0.877	0.813	0.843
	ISS	r	1.000	0.614*	-0.139	0.687*	-0.768*	-0.768*	-0.636*
		p		0.000	0.254	0.000	0.000	0.000	0.000
	Length of hospital stay	r		1.000	-0.097	0.442*	-0.535*	-0.551*	-0.505*
		p			0.429	0.000	0.000	0.000	0.000
	Follow-up	r			1.000	0.014	-0.007	0.007	-0.168
		p				0.912	0.954	0.954	0.169
	WOMAC	r				1.000	-0.767*	-0.751*	-0.655*
		p					0.000	0.000	0.000
	SF-36 Physical	r					1.000	0.938*	0.728*
		p						0.000	0.000
	SF-36 General	r						1.000	0.688*
		p							0.000
Pistol injury group	Age	r	0.086	0.064	-0.008	-0.066	-0.077	-0.048	0.044
		p	0.531	0.643	0.953	0.634	0.575	0.729	0.750
	ISS	r	1.000	0.491*	-0.134	0.561*	-0.652*	-0.590*	-0.488*
		p		0.000	0.331	0.000	0.000	0.000	0.000
	Length of hospital stay	r		1.000	0.087	0.501*	-0.512*	-0.471*	-0.493*
		p			0.527	0.000	0.000	0.000	0.000
	Follow-up	r			1.000	0.076	-0.021	-0.112	-0.084
		p				0.579	0.879	0.414	0.542
	WOMAC	r				1.000	-0.621*	-0.558*	-0.585*
		p					0.000	0.000	0.000
	SF-36 Physical	r					1.000	0.903*	0.808*
		p						0.000	0.000
	SF-36 General	r						1.000	0.763*
		p							0.000

*$p < 0.05$ indicates a statistically significant difference; r: Spearman correlation coefficient.

stays and follow-up durations. Additionally, tissue injury complications, including vascular and nerve injuries as well as the severity of soft tissue damage, were more prevalent in shotgun wounds. Furthermore, a high ISS score was an important factor adversely affecting clinical outcomes.

Tissue injury occurs due to energy transfer from the tissue, which disrupts tissue integrity. The extent of this transfer determines the severity of the firearm injuries. Bullets can be classified into high-kinetic energy and low-kinetic energy projectiles. In civilian settings, firearm injuries typically result from low-kinetic energy firearms, whereas high-kinetic energy firearm injuries are more commonly associated with military trauma.[29-31] The treatment of low-energy gunshot wounds depends on the degree of tissue damage caused by the bullet. In close-range shotgun injuries with shotgun pellets, the damage to the lower extremities can be extensive.[13,20,32] The results of our study were consistent with this knowledge.

The ISS is an essential tool for predicting prognosis and mortality.[4] In a study of 148 patients with low-energy firearm injuries, Abghari et al.[14] reported the results of 133 cases, where the Brief Evaluation of Musculoskeletal Function (SMFA) questionnaire was conducted via telephone. The functional scores were 19.6 (SD 15.9), while disturbance scores were 10.9 (SD 15.6). These patients had worse functional scores than the general population, and persistent pain was commonly reported, with an average pain score of 2.16 (range: 0-8). Aslan et al.[11] found no significant difference in injury severity and clinical outcomes between different firearm types. However, type 3 shotgun injuries had higher ISS values and worse functional outcomes. In the present study, a statistically significant, positive, and moderate correlation was observed between ISS and WOMAC scores in both the shotgun and pistol injury groups. Additionally, a moderate negative correlation was found between ISS and SF-36 scores. In the shotgun injury group, there was a statistically significant, strong negative correlation between ISS and LEFS scores, whereas in the pistol injury group, this relationship was moderate and negative. These findings suggest that a higher ISS is associated with poorer clinical and functional outcomes.

The study observed that length of hospital stay and the number of outpatient clinic visits were higher for patients with shotgun injuries. While the primary cause of prolonged hospitalization and follow-up in firearm injury is the presence of major soft tissue injury, the most critical factor determining limb functionality is the presence of nerve injury.[15] In the present study, LOS and follow-up durations were longer in the shotgun injury group, likely due to the higher incidence of soft tissue and vascular injuries in these patients.

The literature reports that soft tissue injury complications are more prevalent in shotgun injuries. Deitch et al.[15] reviewed the clinical records of 85 patients with 112 extremity shotgun injuries over a six-year period, comparing shotgun-related injuries with other gunshot wounds. The study found that 11% of injuries occurred from long distances (Type I), 30% from medium distances (Type II), and 59% at close range (Type III). Among these cases, major soft tissue injuries were reported in 59%, bone or joint injuries in 44%, and nerve and vascular injuries in 21% and 26%, respectively. In another study, patients with shotgun injuries had a higher need for soft tissue debridement and extremity vascular exploration. The difference in the necessity for extremity vascular surgery was particularly notable in this group.[19] In the present study, Type III injuries were the most frequently observed. While intramedullary nailing was the most commonly used fracture fixation method, external fixation was more frequently preferred in shotgun injuries. Also, in the present study, firearm injuries were most frequently accompanied by primary closure soft tissue injuries. Similar to the findings of Schellenberg et al.,[19] the need for vascular and nerve repair was higher in patients with shotgun injuries.

The treatment of non-fatal shotgun-induced musculoskeletal injuries is highly complex. Although some reviews[10,32,33] and clinical studies[6,14,32] have recommended emergency management, definitive treatment, and fracture fixation in extremity firearm injuries, there is a lack of original comparative studies on this subject in the literature. The definitive treatment approach for these injuries is still debated.[2,12,32] In the present study, debridement and irrigation, which are primary emergency treatment methods, were performed in all cases. External fixator application was preferred in the shotgun injury group, whereas splint application was more commonly used in the pistol injury group. This difference may be attributed to injury type and associated complications.

In patients with lower limb trauma, the injury pattern significantly influences local complication rates, but not systemic complication rates. Firearm injuries related fractures, which occur in one-fifth of patients, increase the risk of vascular and nerve injuries. Among these, vascular injury, with or without an associated fracture, is the strongest predictor of local complications.[34] In this study, joint contracture, Sudeck's atrophy, and union difficulties were common complications. These complications were particularly more frequent in the shotgun injury group, which could be attributed to extensive soft tissue damage affecting, a higher incidence of vascular and nerve injuries, and associated pathologies.

The limitations of this study include its retrospective design, multicenter structure, small number of cases, and the fact that treatment and follow-up were conducted by different surgeons at different centers. These factors may have influenced the outcomes.

CONCLUSION

According to the main results of this study, although pistol and shotgun injuries to the lower extremity showed comparable functional scores, shotgun injuries necessitated longer hospitalizations and follow-up due to more complex soft tissue and neurovascular damage. Injury severity remains the primary predictor of long-term disability, regardless of weapon type. These findings emphasize the need for individualized multidisciplinary management strategies, particularly in patients with high-energy shotgun injuries.

Ethics Committee Approval: Ethics committee approval was obtained from from Alanya Alaaddin Keykubat University, Clinical Research Ethics Committee (Approval Number: 49404, Date: 03.01.2022, Updated: 26.01.2022/01-01).

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